Table of Contents

Preface .................................................................................................................. xviii
Conference Organization .................................................................................. xix

Technologies for Open Learning and Education

A Career Focused Online and Autonomous e-Advising System for Computer Science Learners ........ 1
Hasan Jamil (University of Idaho, USA)

A Dynamic Open Educational Resources Repository to Enhance Primary and Secondary Education .. 4
Fernando Cesar Balbino (University of São Paulo (USP), Brazil),
William Simão de Deus (University of São Paulo (USP), Brazil), and
Ellen Francine Barbosa (University of São Paulo (USP), Brazil)

An Open CS1 Learning Platform to Promote and Incentivize Deliberate Practice ......................... 9
Keyvan Khademi (University of British Columbia, Canada), Mathew de Vin
(University of British Columbia, Canada), Carson Ricca (University of
British Columbia, Canada), Abhineeth Adiraju (University of British
Columbia, Canada), Lydia Lin (University of British Columbia, Canada),
Opey Adeyemi (University of British Columbia, Canada), and Bowen Hui
(University of British Columbia, Canada)

Co-Creating Virtual Reality as Open Educational Resources: An Inquiry-Based Thinking Approach ................................................................. 14
Mark Frydenberg (Bentley University, USA) and Diana Andone
(Politehnica University of Timisoara, Romania)

Design Implications To Digitally Represent The Memory of Visited Webpages ............................ 19
Hiruni Karuppu (University of Colombo School of Computing, Sri Lanka),
Shashini Tharuka (University of Colombo School of Computing, Sri Lanka),
Shamali Sathiindra (University of Colombo School of Computing, Sri Lanka),
Thushani Weerasinghe (University of Colombo School of Computing, Sri Lanka), and Thilini Lakshika (University of Colombo School of Computing, Sri Lanka)
JUnit++: An Open Educational Tool for Simplifying Unit Testing ................................................................. 24
  Opey Adeyemi (University of British Columbia, Canada), Abhineeth
  Adiraju (University of British Columbia, Canada), Seth Akins
  (University of British Columbia, Canada), Keyvan Khademi (University
  of British Columbia, Canada), and Bowen Hui (University of British
  Columbia, Canada)

Stay or Leave? Exploring Student Factors Associated with Dropout Patterns in Massive Open
Online Courses ........................................................................................................................................ 26
  Hui Shi (Florida State University, USA) and Yihang Zhou (Tongji
  University, China)

Adaptive and Personalised Technology-Enhanced Learning (APTeL)

A Computational Model Based on Personality, Mood, Emotion, and Motivation for Online
Learning Environment ......................................................................................................................... 31
  Somayeh Fatahi (University of Saskatchewan, Canada) and Julita
  Vassileva (University of Saskatchewan, Canada)

Adaptive System for Non-Literate Older Adult Learning ................................................................. 33
  Carolina Mejía Corredor (UNIMINUTO, Colombia), Maryuri Agudelo Franco
  (UNIMINUTO, Colombia), and Zaily del Pilar García Gutiérrez
  (UNIMINUTO, Colombia)

Building Contextual Knowledge Graphs for Personalized Learning Recommendations using Text
Mining and Semantic Graph Completion ......................................................................................... 36
  Hasan Abu-Rasheed (University of Siegen, Germany), Mareike Dornhöfer
  (University of Siegen, Germany), Christian Weber (University of
  Siegen, Germany), Gábor Kismihók (Leibniz University Hannover,
  Germany), Ulrike Buchmann (University of Siegen, Germany), and Madjid
  Fathi (University of Siegen, Germany)

Does the Type of Recommender System Impact Users’ Trust? Exploring Context-Aware
Recommender Systems in Education .......................................................................................... 41
  Neha Rani (University of Florida) and Sharon Lynn Chu (University of
  Florida)

Ensuring Inclusivity in MOOCs: The Importance of UDL and Digital Accessibility .................. 44
  Salwa Mrayhi (Virtual University of Tunis (UVT), Tunisia), Mohamed
  Koutheir Khribi (University of Tunis, Tunisia), and Mohamed Jenmi
  (Arab League Educational Cultural and Scientific Organization
  (ALECSO), Tunisia)

Explanation for User Trust in Context-Aware Recommender Systems for Search-As-Learning ...... 47
  Neha Rani (University of Florida), Yadi Qian (University of Florida),
  and Sharon Lynn Chu (University of Florida)

Intelligent Tutoring Systems Examined in Social Experiments—Is the Magic Gone? A
Meta-Analysis ...................................................................................................................................... 50
  Ahmed Tlili (Smart Learning Institute, Beijing Normal University,
  China), Soheil Salha (An-Najah National University, Palestine),
  Huanhuan Wang (Smart Learning Institute, Beijing Normal University,
  China), and Ronghuai Huang (Smart Learning Institute, Beijing Normal
  University, China)
Learning Path Recommendation based on Knowledge Tracing and Reinforcement Learning ................................................................. 55
Han Wan (Beihang University, China), Baoliang Che (Beihang University, China), Hongzhen Luo (Beihang University, China), and Xiaoyan Luo (Beihang University, China)

LSTM Cocktail to Generate Merged Strategies for Sequencing ................................................................. 58
Sylvio Rüdian (German Research Center for Artificial Intelligence, Germany) and Niels Pinkwart (German Research Center for Artificial Intelligence, Germany)

Models of Interactions with E-Books in Estonian Basic Schools ................................................................. 60
Yaroslav Opanasenko (University of Tartu, Estonia), Leo Aleksander Siiman (University of Tartu, Estonia), and Margus Pedaste (University of Tartu, Estonia)

Performance-Differences in Groups based on Preferences in a Language Learning Online Course ................................................................. 63
Sylvio Rüdian (German Research Center for Artificial Intelligence (DFKI), Germany) and Niels Pinkwart (German Research Center for Artificial Intelligence (DFKI), Germany)

Personalized Support Features Learners Expect From Self-Regulated Learning Analytics ................................................................. 66
Adinda Dwiarie (University of Oulu, Finland), Andy Nguyen (University of Oulu, Finland), Joni Lämsä (University of Oulu, Finland), and Sanna Järvelä (University of Oulu, Finland)

Student Profile Clustering Based Personalized Exercise Recommendation: Taking Data Structures Course as An Example ................................................................. 68
Zhaowei Zhang (Nanjing University of Posts and Telecommunications, China), Lin Liu (Nanjing University of Posts and Telecommunications, China), Hui Liu (Jinling Institute of Technology, China), Zhenyu Wu (Nanjing University of Posts and Telecommunications, China), and Hui Liu (Nanjing University of Posts and Telecommunications, China)

The Context for Contextualizing - Design Implications for Adaptive Teacher Support Systems for More Relevant Instruction ................................................................. 71
Nanjie Rao (University of Florida, USA), Qing Li (University of Florida, USA), Shaina Murphy (University of Florida, USA), and Sharon Lynn Chu (University of Florida, USA)

Theory of Planned Behavior Modeled Educational Technology for Waste Management Learning ................................................................. 74
Qiming Sun (Santa Clara University, USA), Shih-Yi Chien (National Chengchi University, Taiwan), and I-Han Hsiao (Santa Clara University, USA)

Mobile Applications of Learning Technologies for Education and Development (MALT)

Autism Artificial Intelligence Performance Analysis: Five Years of Operation ................................................................. 79
Seyed Reza Shahamiri (The University of Auckland, New Zealand)
Challenges and Countermeasures for Improving the Quality of Master’s Thesis in Universities in Guangxi Based on Mobile Learning ................................................................. 84
JiaChao Wei (Nanning Normal University, China), Chenfei Xiang (Nanning Normal University, China), Mengmeng Zou (Nanning Normal University, China), and Jingyi Sun (Nanning Normal University, China)

Co-Designing Nudges for Self Directed Learning within GOAL System ........................................ 86
Kinnari Gatare (Independent Researcher, India), Yuan Yuan Yang (Kyoto University, Japan), Rwitajit Majumdar (Kyoto University, Japan), and Hiroaki Ogata (Kyoto University, Japan)

Unique Mobile Applications for Place-Based Collaborative Learning: The DICE Model .................. 89
Dalit Levy (Zefat Academic College, Israel), Yael Alef (Bar Ilan University, Israel), and Yuval Shafriri (Independent Instructional Designer, Israel)

WhatsApp Communities: Educational Use Cases ........................................................................... 94
Sai Gattupalli (UMass Amherst, USA), Poulomi Chakravarty (Central University of Jharkhand, India), Urjani Chakravarty (IIM Bodh Gaya, India), and Ivon Arroyo (UMass Amherst, USA)

Digital Game and Intelligent Toy Enhanced Learning (DIGITEL)
Exploring the use of Social Gamification during and after Emergency Remote Teaching Caused by Covid-19 .......................................................................................... 97
José Rocha do Amaral Neto (Federal University of Paraíba, Brazil), Wilk Oliveira (Tampere University, Finland), Juho Hamari (Tampere University, Finland), Pasqueline Dantas (Federal University of Paraíba, Brazil), and Isabelle Melo do Nascimento (Federal University of Paraíba, Brazil)

A Pet-Like Model for Educational Robots: Using Interdependence Theory to Enhance Learning and Sustain Long-Term Relationships ...................................................... 100
Vando Gusti Al Hakim (National Central University, Taiwan; Yogyakarta State University, Indonesia), Su-Hang Yang (Chien Hsin University of Science and Technology, Taiwan), Jen-Hang Wang (National Central University, Taiwan), Yu-Chen Chang (National Central University, Taiwan), Hung-Hsuan Lin (National Central University, Taiwan), and Gwo-Dong Chen (National Central University, Taiwan)

An Educational Game to Promote the Development of Computational thinking in Children both Neurotypical and with Intellectual Disabilities ............................................................. 105
Matheus Soppa Geremias (Universidade do Estado de Santa Catarina (UDESC), Brazil), Taïnara Cerigueli Dutra (Instituto Federal do Paraná (IFPR), Brazil), Isabela Gasparini (Universidade do Estado de Santa Catarina (UDESC), Brazil), and Eleandro Maschio (Universidade Tecnológica Federal do Paraná (UTFPR), Brazil)

Assembly Academy: Using Video Games and Virtual Robots to Teach Assembly Programming .... 108
Kaden Gryphon (University of Alabama in Huntsville, USA) and Haeyong Chung (University of Alabama in Huntsville, USA)
Assessing the Relevance of Developing a Gamified Digital Platform to Promote Extracurricular Activities and users’ Sense of Belonging in K-12 Schools ................................. 111
Carlos Santos (University of Aveiro, Portugal), Ana Raquel Carvalho (University of Aveiro, Portugal), Luís Pedro (University of Aveiro, Portugal), and Laura Ferreira (University of Aveiro, Portugal)

Facilitate the Design of Role Learning Games: the RLG Kit ........................................... 113
Guigon Gaëlle (Sorbonne Université, France), Muratet Mathieu (Sorbonne Université, France), Vermeulen Mathieu (IMT Nord Europe, France), and Carron Thibault (Sorbonne Université, France)

Gameful Approaches for the Education of Autistic Children: a Systematic Mapping and Research Agenda ................................................................. 116
Noemi Honorato (Federal University of Ouro Preto, Brazil), Wilk Oliveira (Tampere University, Finland), Juho Hamari (Tampere University, Finland), and Saul Delabrida (Federal University of Ouro Preto, Brazil)

Healthy Pepper: Nutritional Education through Social Robotics and Storytelling ......................... 121
Angela Balzotti (University of Bari, Italy), Berardina De Carolis (University of Bari, Italy), Stefania Massaro (University of Bari, Italy), Loredana Perla (University of Bari, Italy), and Veronica Rossano (University of Bari, Italy)

Understanding the Effects of Gender, Age, and Cultural Orientation on users’ Flow Experience During the use of a Gameful Educational System .............................................. 124
Ainur Issabek (Suleyman Demirel University, Kazakhstan), Wilk Oliveira (Tampere University, Finland), Juho Hamari (Tampere University, Finland), and Andrey Bogdanchikov (Suleyman Demirel University, Kazakhstan)

Computer Supported Collaborative Learning (CSCL)

A Study on Using Online Tagging and Concept Map to Foster Students' Group Cognition .............. 127
Xiaoying Liang (East China Normal University, China) and Jing Leng (East China Normal University, China)

An Alternative Model for Promoting Collaboration and Teamwork in Remote Online Laboratory .. 130
Aisyah Saad Abdul Rahim (Universiti Teknologi MARA, Puncak Alam campus, Malaysia)

An IoT System for Collaboration Analytics in Hybrid Learning Environments ............................ 132
Takuya Fujihara (Osaka University, Japan), Shunpei Yamauchi (Osaka University, Japan), Takumasa Ishioka (Osaka University, Japan), Ritsuko Oshima (Shizuoka University, Japan), Jun Oshima (Shizuoka University, Japan), Kazuhiro Kizaki (Osaka University, Japan), Takuya Fujihashi (Osaka University, Japan), Shunsuke Satozutari (Osaka University, Japan), and Takashi Watanabe (Osaka University, Japan)
Exploring the Use of Badges as Cross-Platform Collaborative Support 
Ishrat Ahmed (University of Pittsburgh, USA), Ruth Wylie (Arizona State University, USA), Stefania Metzger (Arizona State University, USA), Amanda Whitehurst (Arizona State University, USA), Youn Ji Choi (Dartmouth College, USA), Rifa Vhora (Arizona State University, USA), Chloe Dahan (University of Pittsburgh, USA), and Erin Walker (University of Pittsburgh, USA)

Exploring the Relationship between Individual Learners' Physiological Arousal and Learning Outcomes in Collaborative Learning 
Li Xiaoran (Beijing Language and Culture University, China)

Peer Feedback in Online Learning Communities: Its Effectiveness on Internal Motivation from the Perspective of Self-Determination Theory 
Chen-Hsuan Liao (National Yang Ming Chiao Tung University Hsinchu, Taiwan), Hsin-Jung Chung (National Yang Ming Chiao Tung University Hsinchu, Taiwan), and Jiun-Yu Wu (National Yang Ming Chiao Tung University Hsinchu, Taiwan)

Peer-Review to Support Teaching Text Analysis to Digital Humanists using R 
Silvia Margarita Baldiris Navarro (Fundación Universitaria Tecnológico Comfenalco, Colombia) and Jorge Enrique Cachiotis Salazar (Universidad Nacional de Colombia, Colombia)

Big Data in Education and Learning Analytics (BDELA)

A Learner Behavioral Analysis on the Effectiveness of Scaffoldings for Language Learning with Educational Robots and IoT-Based Tangible Objects 
Yueh-hui Vanessa Chiang (National Chengchi University, Taiwan) and Nian-Shing Chen (National Taiwan Normal University, Taiwan)

Automated Analysis of Text in Student-Created Virtual Reality Content 
Jeremy T. D. Ng (The University of Hong Kong, Hong Kong S.A.R.), Ruilun Liu (The University of Hong Kong, Hong Kong S.A.R.), Zuo Wang (The University of Hong Kong, Hong Kong S.A.R.), and Xiao Hu (The University of Hong Kong, Hong Kong S.A.R.)

Clustering Deliberation Sequences through Regulatory Triggers in Collaborative Learning 
Belle Dang (University of Oulu, Finland), Andy Nguyen (University of Oulu, Finland), and Sanna Järvelä (University of Oulu, Finland)

Construction of Electric Circuits Course Knowledge Graph 
Nan Wang (Beijing University of Posts and Telecommunications, China), Dong Liang (Beijing University of Posts and Telecommunications, China), and Ruolin Dou (Beijing University of Posts and Telecommunications, China)

Exploring Factors Limiting Participation in an Online Training Program for College Teachers from Developing Countries 
Chao Wang (The University of Hong Kong; Southern University of Science and Technology, China), Shen Ba (The University of Hong Kong, Hong Kong S. A. R.), Xiao Hu (The University of Hong Kong, Hong Kong S. A. R.), and Yinjuan Shao (International Centre for Higher Education Innovation under the auspices of UNESCO, China)
Preliminary Exploration of the Effectiveness of Music Listening and Music Recommender for Studying in Naturalistic Settings

Ruilun Liu (The University of Hong Kong; Shenzhen Institute of Research and Innovation, China), Zuo Wang (The University of Hong Kong, Hong Kong SAR), Shen Ba (The University of Hong Kong, Hong Kong SAR), and Xiao Hu (The University of Hong Kong; Shenzhen Institute of Research and Innovation, China)

Technology-Enhanced Science, Technology, Engineering and Math Education (TeSTEM)

Can STEM Teaching Improve Students’ Problem-Solving Ability: An Empirical Study in the Middle School

Shijin Li (East China Normal University, China) and Xiaoqing Gu (East China Normal University, China)

Combating Computer Science Retention Hurdles using EnSer Service Learning Collaboratory

Hasan Jamil (University of Idaho, USA)

Implementing Interactive Programming Tutorials in Object-Oriented Programming Education

Brandon Dennis (New Mexico Institute of Mining and Technology, USA), Rita Kuo (Utah Valley University, USA), and Ramyaa Ramyaa (New Mexico Institute of Mining and Technology, USA)

Usability Evaluation of an Online Inquiry-Based Learning Platform for Computational Thinking (CT-ONLINQ)

Nitesh Kumar Jha (Indian Institute of Technology Kharagpur, India), Plaban Kumar Bhowmik (Indian Institute of Technology Kharagpur, India), and Kaushal Kumar Bhagat (Indian Institute of Technology Kharagpur, India)

Using Open Technology to Bring Computational Thinking Activities to the Outdoors

Opey Adeyemi (University of British Columbia, Canada) and Bowen Hui (University of British Columbia, Canada)

Technology-Enhanced Language Learning (TELL)

Applying Content-Based Instruction in Seventh-Grade Food-and-Agriculture English Learning with a Robot-Facilitated Board Game

Yu-Jie Li (National Changhua University of Education, Taiwan (ROC)), Cheng-Ji Lai (National Taichung University of Education, Taiwan (ROC)), Vivien Lin (National Changhua University of Education, Taiwan (ROC)), and Nian-Shing Chen (National Taiwan Normal University, Taiwan (ROC))

The Effectiveness of Integrating a Student Response System into EFL Reading Instruction with Teacher-Interaction vs. Peer-Interaction Technique

Hsin-Yi Cyndi Huang (Southern Taiwan University of Science and Technology, Taiwan), Ching-Jung Tseng (Southern Taiwan University of Science and Technology, Taiwan), Ming-Fen Lo (Southern Taiwan University of Science and Technology, Taiwan), and Yi-Chi Chen (Southern Taiwan University of Science and Technology, Taiwan)
EFL Teachers' Readiness of Distance learning in Taiwanese Secondary School during COVID-19
Kate Tzu-Ching Chen (Chaoyang University of Technology, Taiwan) and Ming-Tzer Lin (Chung-Hsing University, Taiwan)
Digital Storytelling in an EFL Telecollaborative Project
Hsin-Chou Huang (National Taiwan Ocean University, Taiwan) and Barbara Loranc (University of Bielsko-Biała, Poland)
Gather.Town for Pre-Service Teachers of English as a Foreign Language: Learning Outcomes and Virtual Presence
Hsieh-Jun Chen (National Changhua University of Education, Taiwan) and Fang-Ying Lo (Asia University, Taiwan)
Technology-Supported Education for People with Disabilities (TeDISABLE)
An Augmentative and Alternative Communication Synthetic Corpus for Brazilian Portuguese
Jayr Pereira (Universidade Federal de Pernambuco, Brazil), Rodrigo Nogueira (NeuralMind.ai, Brazil), Cleber Zanchettin (Universidade Federal de Pernambuco, Brazil), and Robson Fidalgo (Universidade Federal de Pernambuco, Brazil)
Augmented Learning Environments as Assistive Technology for Kids with Learning Disabilities
Onintra Poobrasert (National Science and Technology Development Agency, Thailand) and Sirilak Luxameevanich (National Science and Technology Development Agency, Thailand)
Be a Buddy: A Smartphone Application to Facilitate Inclusive Communication for DHH users
Sandeep Yadav (IDP in Educational Technology, IIT Bombay, India) and Chandan Dasgupta (IDP in Educational Technology, IIT Bombay, India)
Enhancing Braille Accessibility: An Android Application for Indian Braille Transliteration
Monnie Parida (Indian Institute of Technology Kharagpur, India), Manjira Sinha (Indian Institute of Technology Kharagpur, India), Anupam Basu (Indian Institute of Technology Kharagpur, India), and Tirthankar Dasgupta (TCS Research Kolkata, India)
Investigating the Role of Closed Captioning and Live Transcription on DHH Students' Perception of Inclusivity in a Face-to-Face Classroom Environment
Sonika Pal (Indian Institute of Technology Bombay, India), Vishwas Badhe (Indian Institute of Technology Bombay, India), and Chandan Dasgupta (Indian Institute of Technology Bombay, India)
Artificial Intelligence and Smart Learning Environments (AISLE)
A Machine Learning Approach for the Identification of Learners' Misconceptions in Algebraic Problem Solving
Joice Cazanoski Gomes (Universidade Federal do Paraná (UFPR), Brazil) and Patricia A. Jaques (Universidade Federal do Paraná (UFPR); Universidade Federal de Pelotas (UFPEL), Brazil)
AI-Assisted Learning with ChatGPT and Large Language Models: Implications for Higher Education ................................................................. 226
Samuli Laato (Tampere University, Finland), Benedikt Morschheuser (FAU Erlangen-Nürnberg, Germany), Juho Hamari (Tampere University, Finland), and Jari Björne (University of Turku, Finland)

An Approach to Design a Tool to Auto-Generate Online Short Notes Based on School Textbooks ... 231
Artificial Intelligence (AI) Literacy Questionnaire with Confirmatory Factor Analysis ................. 233
Davy Tsz Kit Ng (The University of Hong Kong, China), Wenjie Wu (The Chinese University of Hong Kong, China), Jac Ka Lok Leung (The Hong Kong University of Science and Technology, China), and Samuel Kai Wah Chu (The University of Hong Kong, China)

Chatbot Design to Help Learners Self-Regulate their learning in Online Learning Environments ........................................................................... 236
Wijdane Kaiss (University Hassan II of Casablanca, Morocco; University Bretagne Sud, France), Khalifa Mansouri (University Hassan II of Casablanca, Morocco), and Franck Poirier (University Bretagne Sud, France)

Developing AI-Based Automated Post-Rating System to Scaffold Interdisciplinary Knowledge-Sharing .................................................................................................................. 239
Chia-Kai Chang (National Central University, Taiwan), Po-Chung Chen (National Central University, Taiwan), Zih-Syun Chen (National Central University, Taiwan), and Tonny Menglun Kuo (National Tsing Hua University, Taiwan)

Development of an AR Food Education System to Support Elementary School Nutrition Education ......................................................................................................................... 242
Yen-Ting Lin (National Pingtung University, Taiwan), Fang-Ni Wu (National Pingtung University, Taiwan), Zi-Ying Tsai (National Pingtung University, Taiwan), and Yu-Shan Huang (National Pingtung University, Taiwan)

Learning with Explainable AI-Recommendations at School: Extracting Patterns of Self-Directed Learning from Learning Logs ......................................................................................... 245
Rwitajit Majumdar (Kyoto University), Kyosuke Takami (National Institute for Educational Policy Research (NIER); Kyoto University, Japan), and Hiroaki Ogata (Kyoto University; National Institute for Educational Policy Research (NIER), Japan)

The Design and Analysis of a Storytelling Chatbot with Natural Language Processing Techniques for Enhancing EFL Reading ........................................................................................................... 250
Yong Ting Feng (National Central University, Taiwan), Chen-Chung Liu (National Central University, Taiwan), and Chia-Hui Chang (National Central University, Taiwan)

Augmented Reality and Virtual Worlds in Education and Training (ARVWET)

A Modularity Approach in Design Science Research for Mixed Reality Learning Artifacts .......... 252
Benedikt Hensen (RWTH Aachen University, Germany)
An Augmented Reality Application to better Understand 3D Astronomy Concepts in the 7th Grade ................................................................. 255
Mariana Bela (University of Aveiro, Portugal), Inês Mendes (University of Aveiro, Portugal), and Mário Vairinhos (University of Aveiro, Portugal)

Authoring Tools for Teaching in VR – an Evaluation Study ................................................................. 258
Sinja Müser (Hamm-Lippstadt University of Applied Science, Germany), Jens Maiero (Bonn-Rhein-Sieg University of Applied Science, Germany), Jörg Meyer (Hamm-Lippstadt University of Applied Science, Germany), and André Hinkenjann (Bonn-Rhein-Sieg University of Applied Science, Germany)

Critical Digital Skills Enhancement in Virtual Reality Environments ................................................................. 261
Chrysoula Lazou (International Hellenic University, Greece), Avgoustos Tsinakos (International Hellenic University, Greece), and Ioannis Kazanidis (International Hellenic University, Greece)

Design of Embodied Conversational Agent to Elicit Participants’ Reasoning for their Decisions Taken Inside a VR Environment ................................................................. 266
Herold Pc (Indian Institute of Technology Bombay, India) and Chandan Dasgupta (Indian Institute of Technology Bombay, India)

Development and Testing of a Real Time Virtual Reality Body Avatar Creation and Body Appreciation Experience for Young Adults ................................................................. 271
Fang Wang (University of Missouri), Scottie Murrell (University of Missouri), Virginia Ramseyer Winter (University of Missouri), and Charles Sielert (University of Missouri)

Embodied Learning through Drama-Based Situatedness using Immersive Technology in the Classroom ................................................................. 274
Jen-Hang Wang (National Central University, Taiwan), Mahesh Liyanaavatha (National Central University, Taiwan), Chia-Ying Lee (National Central University, Taiwan), Yu-Ling Huang (National Central University, Taiwan), Su-Hang Yang (Chien Hsin University of Science and Technology, Taiwan), and Gwo-Dong Chen (National Central University, Taiwan)

Immersive Modeling Framework for Training Applications ................................................................. 277
Vinicius Chrisosthemos Teixeira (Pontifical Catholic University of Rio Grande do Sul, Brazil), Carlo Smaniotto Mantovani (Pontifical Catholic University of Rio Grande do Sul, Brazil), Alexandre Cardoso (Federal University of Uberlândia, Brazil), Carlos Alexandre dos Santos (Pontifical Catholic University of Rio Grande do Sul, Brazil), and Márcio Sarroglia Pinho (Pontifical Catholic University of Rio Grande do Sul, Brazil)

MetaClassroom: A WebXR-Based Hybrid Virtual Reality Classroom ................................................................. 280
Yue-Tang Liu (Tamkang University, Taiwan), Pei-Yu Cheng (Tamkang University, Taiwan), Sheng-Pao Shih (Tamkang University, Taiwan), and Tai-Yi Huang (University of North Texas, United States)

Teachers’ First Contact with an Immersive Web Environment: Evaluating Social Presence and Possible Effects on Learning Outcomes ................................................................. 282
Ricardo Carvalho (University of Aveiro, Portugal), Carlos Santos (University of Aveiro, Portugal), and Fernando Ramos (University of Aveiro, Portugal)
Motivational and Affective Aspects in Technology-Enhanced Learning (MA-TEL)

“I Got to Know Many Things, and Also Realised How Much I Don’t Know Yet”: Students’ Involvement in a Sensemaking Task and its Effect on Self-efficacy ......................................................... 290
Sunita Raste (Indian Institute of Technology, Bombay, India) and Sahana Murthy (Indian Institute of Technology, Bombay, India)

Affective Lexicon for Intelligent Tutoring Systems ......................................................... 293
Mohammad Mustaneeer Rahman (University of Tasmania, Australia), Soonja Yeom (University of Tasmania, Australia), Nadia Ollington (University of Tasmania, Australia), and Robert Ollington (University of Tasmania, Australia)

Like Me? An Empirical Study on Social Comparisons and Emotion Dispositions in Online Learning Outcomes .......................................................................................................................................................................................................................................................... 296
Misook Heo (Duquesne University) and Natalie Toomey (Georgia College and State University)

Sean Eom (Southeast Missouri State University, USA)

An Early Case Study Analyzing Teachers’ Acceptance towards the use of Gameful Approaches in Education in Brazil .......................................................................................................................................................................................... 304
Roberto Farias (Secretary Education of Rio de Janeiro, Brazil), Wilk Oliveira (Tampere University, Finland), and Juho Hamari (Tampere University, Finland)

Using Video Streaming Feeds to Encourage Informal Learning ........................................ 307
Rania Islambouli (École polytechnique fédérale de Lausanne (EPFL), Switzerland), Sandy Ingram (Haute école d’ingénierie et d’architecture de Fribourg, HES-SO, Switzerland), Isabelle Vonèche Cardia (École polytechnique fédérale de Lausanne (EPFL), Switzerland), and Denis Gillet (École polytechnique fédérale de Lausanne (EPFL), Switzerland)

Technology-Enhanced Assessment in Formal and Informal Education (TeASSESS)

A Learning Management System for Tracking and Assessment of Online Team Projects .......... 312
Hasan M Jamil (University of Idaho, USA)

Automatic Evaluation of Chinese Short-Answer Questions based on Structure of Observed Learning Outcomes .......................................................................................................................................................................................... 315
Jie Cao (Beijing Normal University, China), Ziyuan Fang (Beijing Normal University, China), and Shengquan Yu (Beijing Normal University, China)
Design and Implementation of Campus Surveillance System Based on ZLMediaKit .......................... 356
Wenya Wang (Ningbo University, China), Runyu Zhao (Ningbo University, China), Jie Mei (Ningbo University, China), and Kan Zheng (Ningbo University, China)

Multi-Source Education Knowledge Graph Construction and Fusion for College Curricula ........... 359
Zeju Li (Beijing University of Posts and Telecommunications), Linya Cheng (Beijing University of Posts and Telecommunications), Chunhong Zhang (Beijing University of Posts and Telecommunications), Xinning Zhu (Beijing University of Posts and Telecommunications), and Hui Zhao (Beijing University of Posts and Telecommunications)

The Nexus between Work and Stress: Challenges with IoE based Hands-on Engineering Education during Lockdown Due to Pandemic .......................................................... 364
Rathin Biswas (Indian Institute of Technology Delhi, India), Vivek Sabanwar (Indian Institute of Technology Bombay, India), and Kavi Arya (Indian Institute of Technology Bombay, India)

Doctoral Consortium

An Adaptive, Structure-Aware Intelligent Tutoring System for Learning Management Systems ..... 367
Sebastian Kucharski (Dresden University of Technology, Germany), Iris Braun (Dresden University of Technology, Germany), and Tommy Kubica (Dresden University of Technology, Germany)

Investigating Trust in Context-Aware Recommender System in Education ............................ 370
Neha Rani (University of Florida)

Towards the Development of a Model to Detect Learned Helplessness Among Grade 6 Mathematics Students .......................................................... 373
John Paul P. Miranda (University of the East, Philippines) and Rex P. Bringula (University of the East, Philippines)

Author Index ................................................................. 377